Abstract for:

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Title: Improved Estimation of Magnetic Footpoint Velocities in Active Regions*

Abstract: The accurate estimation of magnetic footpoint velocities from a sequence of photospheric magnetograms is critical for predicting activity associated with that active region. In particular, accurate footpoint velocities can be used to directly compute accurate values for magnetic energy and helicity fluxes through the photosphere. We have developed a new technique for determining the magnetic footpoint velocities in which we apply the magnetic induction equation and an affine velocity profile to a windowed subregion of the magnetogram sequence. This produces an overdetermined system that can be solved directly by standard least squares methods. Using synthetic data, in which the actual optical flow velocities are known, we show that the new technique is superior to the usual local correlation tracking (LCT) approach.

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